PATENT SPECIFICATION (11) 1 427 191

1 427 191

(21) Application No. 22414/73 (22) Filed 10 May 1973
(31) Convention Application No. 3 425/72 (32) Filed 19 May 1972 in (33) Czechoslovakia (CS)
(44) Complete Specification published 10 March 1976
(51) INT. CL.² B32B 5/26 5/08
(52) Index at acceptance
B5N 0506 0508 0518 0526 1702 2702 2730 2732 2734 2736
D1R 4

(72) Inventors BOHUMIL PILLER
ZDENEK KOCHTA
BEDRICH KOUDELKA
JAN ZELEZNY

(54) MULTILAYER FABRIC AND METHOD OF PRODUCING THE SAME

(71) We, VYZKUMNY USTAV PLETARSKY, an Enterprise organised and existing under the laws of Czechoslovakia, of Brno, Czechoslovakia, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement: —

This invention relates to a multilayer fabric and the method of producing the same.

It is known that a fibrous web can be bonded to a fabric by means of a thermoplastic binder, or it is possible when producing the web to add to the fibres of the web fibres having a melting point which is substantially lower than the melting point of the fibres constituting the actual fibrous web. Fibres having a lower melting point are plasticised by heat and consequently the remaining fibres are bonded together where they cross each other. The structure of fibres having a low melting point is changed owing to the heating thereof.

In a further method it is also known to additionally apply a binder to the fibres. This binder is heat melted and bonds the fibres at their cross-over points, to reinforce the fibrous web.

It is further known that fibrous webs are produced having at least two types of fibre, each of which is a chemical polymer having a different shrinkage and melting point from the other. The fibre bonding is achieved by heating the fabric above the melting temperature of the fibre having the lower melting point.

It is also known that fibres composed of two components having a core-sheath structure are reinforced during spinning. The core forming component of the fibre has to have a melting temperature range (i.e. a temperature range between the plasticising and the melting point) at least 20°C higher than the sheath forming fibre. The heat treatment is carried out at temperatures between the plasticising and the melting temperature of the sheath forming fibre component.

While fabrics consisting of fibres bonded according to the above described known methods have an increased strength they have the disadvantage of having a higher stiffness and a deteriorated drape. Further while fabrics bonded by stitch-knitting of the web by a binding warp have better drape properties, they have the disadvantage that the fibres in the web are deposited too loosely with the result that during use the fibres come on to the fabric surface thereby decreasing the abrasion resistance of the same and forming pills frequently.

An object of the present invention is to obviate or mitigate the above mentioned disadvantage.

According to the present invention there is provided a multilayer fabric having a plurality of individual layers at least one of which contains multicomponent thermally-bondable fibres amounting to at least 2 per cent of the entire multilayer fabric weight, said layers being thermally-bonded together at least at selected areas thereof, and also stitch-bonded together.

Further according to the present invention there is provided a method of producing a multilayer fabric, comprising arranging in face-to-face relationship a plurality of individual layers at least one of which contains multicomponent thermally-bondable fibres amounting to at least 2 per cent of the weight of the entire multilayers fabric, thermally bonding said layers together at least at selected areas thereof, and also stitch-bonding the layers together.

The fibrous layer or layers containing the multicomponent, especially bicomponent, fibres which can be thermally bonded have

advantageously a latent crimping ability. These layers can include natural or man-made mineral fibres or yarns or blends of the same and the multilayer fabric can als comprise a knitted or woven fabric, sheet or foam. When stitch-bonding with thread, a chain, atlas, tricot, plain cord, underlapping or combinations of these stitches can be used. Stitch-bonding can be carried out also without thread by withdrawing fibre bundles out of the fabric by stitch-bonding needles. One or both outer surfaces of this fabric can be raised.

The multilayer fabric is produced in such a way that thermal-bonding of the fibrous layer or layers containing heat bondable fibres is carried out before or after stitch-bonding. The melting temperature of the stitch-bonding thread is at least 10°C higher than the melting temperature of the thermally-bondable component of the bicomponent or multicomponent fibre when the layers are thermally-bonded over the entire area thereof. Thermal bonding can be carried out also at selected areas when the melting temperature of the stitch bonding thread can be the same as or not more than 10°C higher than the temperature of the thermally-bonding component of the bicomponent or multicomponent fibre. This thermal bonding is carried out by dry or wet heat, advantageously in a cabinet dryer by hot air or superheated steam, or by heat calendering, whereby before thermal bonding a latent crimp of the multicomponent fibre can be developed, while after thermal-bonding and stitch-bonding one or both outer surfaces of this multilayer nonwoven fabric can be raised on a raising machine.

Bv forming a fibrous web and a web reinforced by thermal-bonding and subsequently reinforcing this fabric by stitch bonding with thread, a multilayer fabric having new integrated properties, is achieved.

In this case, an increased pilling and abrasion resistance of the fabric is achieved. Placing an individual layer of multicomponent fibres in the middle of the fabric or on the back of the same, and stitch-bonding the whole system on the stitch-bonding machine, by a prolonged heat treatment of the fabric the coherence of the fibres constituting the main part of the fabric can be increased. The ends of the fibres of this fabric can be raised on the surface of the fabric. A pile fabric is achieved, the fibre ends of which are held in the fabric not only by the stitch-bonding but also bv the thermal-bonding.

Embodiments of the present invention will now be described by way of illustration in the following Examples.

Example 1

A multilayer fabric is produced from two individual layers. The under layer contains 100 per cent p lypropylene staple fibres 15 den of a staple length of 90 mm. so that a web of density 380 g/m² is formed.

The upper layer contains only bicomponent heterofil fibres of polyamide 6/polyamide 66 of density 40 g/m² being spot bonded by heating and being of the same colour as the under layer. The layers are stitch-bonded together on a stitch-bonding machine using polyamide filament yarn 120 den by an offset tricot stitch.

The stitch-bonded fabric is heat treated without pressure for 3 min. at 155°C in a jet heating machine. A multilayer nonwoven fabric is achieved, which can be used as a floor covering the surface of which has high pilling and abrasion resistance.

Example 2

A multilayer fabric is produced from two individual layers. The under layer contains 100 per cent rayon staple fibres, 3.5 den of a staple length of 60 mm. so that a web having a density of 180 g/m² is formed.

The upper layer contains only bicomponent heterofil fibres of polyamide 6/polyamide 66 of density 20 g/m², being spot bonded by heating and being grey or of the same colour as the under layer or patterned by printing.

The layers are stitch-bonded together on a stitch-bonding machine by a polyamide 6 filament yarn in a two-course atlas stitch. The stitch-bonded fabric is heat treated without pressure for 2 min. at 155°C in a jet heating machine.

Thus a multilayer fabric is achieved, having a high abrasion and pilling resistant upper layer, which can be used as an upholstery fabric of good end-use properties, good shape stability, drape and being run proof, for home and car upholstery.

Example 3

A multilayer fabric consists of three individual layers. Both outer lavers contain polvacrylonitrile staple fibres 6 den of a staple length of 80 mm. such that a web having a density of 170 g/m² is formed. The middle laver contains bicomponent heterofil polvpropvlene/polvethylene fibres of density 25 g/m². The three lavers are stitch-bonded together on a stitch-bonding machine using polvester filament yarn 20 den in a combined chain-plain cord stitch by threading one and one.

The stitch-bonded fabric is heat treated in a jet heating machine without pressure at 120°C. raised on both sides and the pile felted in the usual way when raising and

adjusting blankets. Thus a multilayer non-w ven pile fabric is achieved, the pile of which is well anchored and has a go d shape stability both in use and more especially in household machine washing.

Example 4

A web of density 60 g/m² of bicomponent polyamide 66/polypropylene fibres is formed on a web former. This web is stitch-bonded on a stitch-bonding machine equipped with an additional device, using a binding thread of polyamide 6 filament yarn 120 den in a chain stitch the additional device attaching a polyamide 6 tow by an underlapping process.

The back of this stitch-bonded fabric is heat treated on a heated calender roll, the temperature of which is 110°C. This temperature exceeds the softening temperature of the lower melting range polymer of the multicomponent fibres. The product achieved, i.e. a multilayer non-woven loop upholstery fabric, has well attached loops in the base layer and good shape stability and is run-proof.

Exampie 5

A multilayer fabric consists of two individual layers. The under layer contains 100 per cent glass staple fibres 6 den of a staple length of 80 mm. such that the web formed has a density of 150 g/m².

The upper layer contains only bicomponent heterofil polyamide 6/polyamide 66 fibres of density 20 g/m², spot bonded by heating and printed with a deep pattern.

The layers are stitch-bonded together on a stitch-bonding machine using a glass filament yarn 22 tex ×2×2/440 S in a two-course atlas stitch by threading according to the pattern. The multilayer non-woven fabric can be used as a decorative fabric for drapery or as self-adherent wallpapers. In both cases the fabric shows a decreased inflammability, high abrasion resistance, a wide patterning range and good sound insulation.

WHAT WE CLAIM IS:—

1. A multilayer fabric having a plurality of individual layers at least one of which contains multicomponent thermally-bondable fibres amounting to at least 2 per cent of the entire multilayer fabric weight, said layers being thermally-bonded together at least at selected areas thereof, and also stitch-bonded together.

2. A fabric as claimed in claim 1, wherein at least said one layer contains bicomponent fibres.

3. A fabric as claimed in claim 1 or 2, wherein the or each fibrous layer has a latent crimp property

4. A fabric as claimed in any one of the preceding claims, wherein the layers are stitch-bonded with thread.

5. A fabric as claimed in claim 4, wherein the layers are thermally-bonded together over the entire area thereof and the melting temperature of the stitch-bonding thread is at least 10°C higher than the melting temperature of the thermally-bondable component of the multicomponent fibre.

6. A fabric as claimed in claim 4, wherein the layers are thermally-bonded together at selected areas only and the melting temperature of the stitch-bonding thread is the same as or not more than 10°C higher than the melting temperature of the thermally-bondable component of the multicomponent fibre.

7. A fabric as claimed in any one of claims 1 to 3, wherein the layers are stitch-bonded without thread by using fibre bundles withdrawn out of the fabric by stitching-bonding needles.

8. A fabric as claimed in any one of the preceding claims, wherein one or both outer surfaces of the fabric are raised.

9. A method of producing a multilayer fabric, comprising arranging in face-to-face relationship a plurality of individual layers at least one of which contains multicomponent thermally-bondable fibres amounting to at least 2 per cent of the weight of the entire multilayer fabric, thermally bonding said layers together at least at selected areas thereof, and also stitch-bonding the layers together.

10. A method as claimed in claim 9, wherein the stitch-bonding is carried out with thread and the thermal-bonding is carried out over the entire area of the layers, the melting temperature of the stitch-bonding thread being at least 10°C higher than the melting temperature of the thermally-bondable component of the multicomponent fibre.

11. A method as claimed in claim 9, wherein the stitch-bonding is carried out with thread and the thermal-bonding is carried out at selected areas only, the melting temperature of the stitch-bonding thread being the same as or not more than 10°C higher than the melting temperature of the thermally-bondable component of the multicomponent fibre.

12. A method as claimed in any one of claims 9 to 11, wherein latent crimp ability

of the multicomponent fibres is developed before the thermal-bonding process.

13. A method as claimed in any ne of claims 9 to 12, wherein one or both outer surfaces of the fabric is raised.

14. A multilayer fabric substantially as hereinbefore described in any one of Examples 1 to 5.

15. A method of producing a multilayer fabric, substantially as hereinbefore described in any one of Examples 1 to 5.

FITZPATRICKS,
Chartered Patent Agents,
14-18, Cadogan Street,
Glasgow, G2 6QW

and

Warwick House,
Warwick Court,
London, WC1R 5DJ.

Printed for Her Majesty's Stationery Office by The Tweeddale Press Ltd., Berwick-upon-Tweed, 1976.
Published at the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.